

1. How does the cell wall's surface area/volume ratio compare with that of larger organisms? What advantages does a high surface area/volume ratio offer? What constraints does it place on a cell?
2. What bacterial cell wall structures may help to increase the cell's surface area/volume ratio?
3. If you performed a microscopic examination of an appropriately stained preparation of *S. aureus* would you expect all the cells to be arranged in clusters?
4. Explain why some species of cocci appear as chains but others appear in a cuboidal manner?
5. Draw a typical bacterial cell and identify all parts.
6. Contrast propulsion by a bacterial flagellum with that by a screw propeller on a submarine.
7. What functions might chemotaxis, phototaxis and magnetotaxis have for their bacteria in natural habitats?
8. What problems associated with the shape and motility of spiroplasmas still remain to be solved?
9. What is the function of a capsule in:
 - (i) a pathogenic bacteria
 - (ii) soil bacteria under drought conditions
 - (iii) bacteria living in a flowing stream
10. Why Gram-negative bacteria are easier to disrupt by sonic oscillation than Gram-positive eubacteria?
11. Compare a Gram-positive and Gram-negative cell wall. List the major differences in the cell walls between archaeobacteria and eubacteria?
12. What is the function of porin? What is the function of cytoplasmic membrane/outer membrane adhesions?
13. In what kinds of bacteria and bacterial cell structures do you find the following compounds?
 - a. peptidoglycan
 - b. teichoic acid
 - c. calcium dipicolinate
 - d. cholesterol
 - e. lipopolysaccharides
 - f. phytanols ether-linked to glycerol
14. Is formation of endospore a method of reproduction or multiplication?
15. What are similarities and differences between protoplasts and spheroplasts?
16. Name the cytoplasmic inclusions or substances along with their functions?
17. What are the chemical nutrients needed by all forms of life for growth?

18. Distinguish between phototrophs-chemotrophs, lithotrophs-organotrophs, autotrophs-heterotrophs.

19. Is nutrient broth a universal medium? Explain.

20. Mention the toxic derivatives of oxygen. Explain how aerobic organisms might protect themselves against these derivatives.

21. What conditions of cultivation would you allow to grow selectively:

a. *Thiobacillus thiooxidans*

b. *Neisseria gonorrhoeae*

c. syenothermophile *Clostridium thermosaccharolyticum*

d. extreme halophile from a sample of sea-salt

e. nitrogen-fixing bacterium from soil.

22. How do you grow stringent anaerobes? How do you enrich aerobic bacteria?

Reference: Pelczar Chapter 5 & 6.